



*The unique sensitivity of children to toxicants has often been overlooked.*

## Editorial

### Playing in the Sand

Children were a common theme for the impressionist painter Mary Cassatt. Her "Children on the Beach" depicts a placid scene around the turn of the century. With buckets and small shovels, two little girls in beach dresses, one with a sun bonnet, make an attempt to change the sandy landscape; in the background sailboats float serenely in the calm waters. On viewing the painting, we feel that everything is right with the world. If only it were true. We love our children; we pamper them; we indulge them; we educate them—but we also pollute their environment.

Exposure to toxicants is a daily experience for our children. The exposures occur in ways in which we often are not aware. Children play in sand that may contain toxicants of unknown origin. Children play on the lawn and, as children will do, end up with soil on their hands and in their mouths. The lawn may have been recently treated with fertilizers, herbicides, fungicides, and pesticides. The soil may be contaminated with lead and mercury. They play on rugs that have been sprayed with pesticides to kill the fleas brought in by the family pet. As they crawl and waddle around, they inhale paint fumes when we redecorate our homes. Because of their short stature, they are closer to the floor and inhale the more dense vapors at concentrations much higher than those that we ourselves inhale. We smoke cigarettes; they breathe our smoke. They eat foods that have been treated to maintain freshness and often contain incidental quantities of agricultural chemicals. While the quantities of these chemicals are not normally a problem for adults, the quantities may become a problem for children. Because children have a higher ratio of food intake to body weight, children ingest relatively larger quantities of preservatives and agricultural chemical residues than adults.

As important as the route of exposure is, the unique sensitivity of children to toxicants has often been overlooked. Through the years research has focused on the evaluation of toxicity of chemicals to young adult males with an average weight of 70 kg. The choice of males for study is not surprising given the social climate of the past. But now with heightened awareness of discrimination, the sophistication of toxicokinetic modeling, and the advent of new methods in molecular biology, the unique susceptibility of individual genders and races are being explored. The importance of age on differences in the rate and extent of adsorption, distribution, metabolism, excretion, metabolic pattern, and the differences in target organ susceptibility can be better quantified. With their unique diets, physiology, and stage of development, children experience unique patterns of exposure, accumulation, elimination, and metabolism of toxicants.

A fundamental change in toxicology research has occurred. The evaluation of the effect of age on toxicokinetic parameters has become routine. For example, the National Toxicology Program (NTP), a U.S. Department of Health and Human Services program established to coordinate toxicology research and testing activities within the department, has recently established formal guidelines for toxicokinetic stud-

ies. These guidelines require the evaluation of the effect of age on kinetics parameters for chemicals evaluated in NTP's state-of-the-art toxicology studies (1).

Awareness of the problem should be expanded. It is only with this increased emphasis that research money will find its way to children's issues. In conjunction with the research budget increases, the risk assessment processes should incorporate children's issues into the equation.

The research and policy communities are moving in this direction. A group that is spearheading the children's environmental health issue is the Children's Environmental Health Network (CEHN). This project has its coordinating office in Emeryville, California, and is dedicated to pediatric environmental health. Its stated goals are to promote the development of sound public health and child-focused national policy; stimulate prevention-oriented research; educate health professionals, policy makers, and community members in prevention strategies; and elevate public awareness of environmental hazards to children (2). Many local, state, and national public and private organizations are working with CEHN to promote child health issues. Our own institute, the NIEHS, has been a sponsor of conferences and research support for CEHN.

Two U.S. government agencies that have established programs to address children's issues include the National Institutes of Health (NIH) and the EPA. NIH's Children's Cancer Group collects data on cancer incidence in children as well as sponsoring research on causes, prevention, and treatment of childhood cancers. A newly established EPA center for children will provide a clearinghouse for research on children within the agency and review existing EPA standards to make sure they protect children (3).

*Environmental Health Perspectives* has been an important source of information on children's environmental health issues and will continue to encourage submission of papers that address this topic. In 1995, *EHP* published a monograph based on a 1994 conference titled "Preventing Child Exposures to Environmental Hazards: Research and Policy Issues," which was organized by Joy Carlson of the CEHN (4). In 1998, we plan another *EHP* monograph based on papers from a February 1997 conference titled "Children's Environmental Health: Research, Practice, Prevention, and Policy," which was also organized by CEHN, with NIEHS as the principal sponsor. Editorial comment has been made on the disproportionate exposure of socioeconomically disadvantaged children to environmental pollutants (5). In the past several months, *EHP* has chronicled exposure to lead of children around the world (6–10). Asthma in children has been another area of *EHP* coverage (11–13), and in the current issue, the association between particulate air pollution and infant mortality in the United States was reported for the first time (14).

If artists are to continue to paint placid images of our children, there must be greater recognition of the major impact of environmental pollution on children. Newly developed tools, such as molecular biology, can

be used to expand investigations into areas of environmental research that emphasize children's health. The better we take care of our children now, the less we will have to spend later in addressing their future health problems. It is the purest form of research on prevention. We intend for *EHP* to be an active voice for children's advocacy.

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